

REMARKS

Applicants thank the Examiner for granting an interview on December 20, 2006.

This Amendment follows up on that interview, and in particular the Examiner's suggestion in the Interview Summary that the differences argued be "fleshed out a little bit more clearly in the independent claims." Amendments in independent claims 1, 9, 16, 27, and 29 now expressly states that the pixel luminance correction is based on a function derived from said predetermined gradation characteristics of the display means. As noted at the interview, prior art does not correct luminance as a function of gradient characteristics of the display.

This functional relationship is described in the specification, in terms of the operation of Look Up Tables ("LUT"). For example, "CaLUT" is the determined luminance value from a LUT, after application of RLUT, a gradient correction LUT that operates on the input luminance values k, or those k values subjected to other processing (estimated contrast, sharpening).

The functional relationship between the predetermined display gradient characteristics and the luminance corrections is emphasized by adding "as a function derived from" in claims 1, 9, 16, 27 and 29. In addition, "of said display means" is added to make it clear that the gradient characteristics used for the luminance corrections are those of the display. The gradient characteristics are also identified as "predetermined" to provide a clearer antecedent basis.

In claims 16, 19, 27, and 29, "so as to reduce nonlinearity of" is added to make the nature of the luminance correction clearer. The linearity of the functional relationship between the predetermined display gradation characteristics and the luminance correction is express.

Applicants again gratefully acknowledge that the Examiner has found patentable subject matter in claim 3, which would be allowed if rewritten to include the subject matter of all the claims from which it depends.

The present invention relates to image processing devices and methods, and in particular to apparatus and methods to deal with display devices, as for electronic publishing, that have biased (nonlinear) gradation characteristics, which causes the displayed images to be uneven and more difficult to see. For liquid crystal displays, as

explained on page 14, lines 17-20, "white small regions are likely to collapse in general; and where the image is displayed, the small characters fade in many cases."

The art rejections in the pending Action hinge on the disclosure of Shiraiwa U.S. Patent No. 6,201,893. As discussed at the interview, Shiraiwa does not disclose, or even suggest, use of the display bias gradation characteristics as an input to any processing of corrected luminance values.

Applicants respectfully traverse the rejection of claims 16, 18 and 27 under 35 USC 102(b) as anticipated by Shiraiwa U.S. Patent No. 6,201,893. Applicants also respectfully traverse the rejection under 35 USC 103(a) of all but claim 13 as obvious in view of Shiraiwa when combined with various other references, namely,

Hayashi (claims 1, 9, and 14), Hayashi and Tokuyama (claims 2,6, 8, 10, 15, 19, 23, 25, 26, and 29), Hayashi and Kuo (claims 11 and 12), Hayashi, Tokuyama, and Takagi (claim 3), Hayashi, Tokuyama and Pollard (claims 4, 5, 21, and 22), Kuo (claims 17 and 28), Tokuyama and Takagi (claim 20); Tokuyama, Pollard, and Katsuyama (claims 21 and 22) and Tokuyama and Yamazaki (claim 24).

The main thrust of Shiraiwa is to have known image values, such as whiteness balance and a stable luminance range. The main technique of Shiraiwa is to use plural input ("pickup" images) to develop correction parameters for the processed image data to achieve this whiteness balance and stable range.

While Fig. 1 of Shiraiwa shows a display device 40, its gradation characteristics are not used as an input to the luminance correction. In Shiraiwa, Fig. 1, image data flows from the image pickup unit 10 to the display unit 40. No reverse feedback, whether an actual data flow or some estimation of the display gradation characteristic from the display unit to the processing unit 30, is shown or suggested. Moreover, the stated purpose of the Shiraiwa invention is to control "aging of the image pickup element and color filters or a change in illumination light source." (Col. 1, lines 18-20, emphasis supplied.) Shiraiwa compensates for variations of the image input to the television imaging system, not to control gradient bias for characteristics of its output display.

This difference is reflected in the emphasis in Shiraiwa on uniformity in white balance, luminance level, and color tone and the use of plural pickup images (See Col.

2, lines 55-59) as input to the generation of parameters to produce the adjustments in the image data transmitted to the display.

Further, Applicants do not find in Shiraiwa a "correction of luminance" of each of the plurality of pixels constituting the image," as claimed. In particular, Applicants do not find a teaching or suggestion in Shiraiwa that the operation of any of its parameters varies with (is a function of) the nature of the display in a given region.

Further, Shiraiwa at Col. 8, line 16-20, states that the "gist" of its invention is to "determine the image reproduction parameters used upon conversion of image pickup data into an image signal on the basis of a plurality of image pickup data." (Emphasis supplied.) The present invention does not look to plural input images to generate the claimed correction.

In sum, Shiraiwa discloses a different solution to a different problem. It neither teaches nor suggests, among other features, the use of gradation characteristics of an output display device to correct luminance values.

As noted at the interview, the Examiner cited the Hayashi reference only to show the linearity of a correction (in Hayashi of color/toner density gradient patterns of a printed output image). Hayashi does not teach the claimed functional relationship between predetermined gradient characteristics of a display and luminance correction.

The other prior art of record may teach isolated features of the invention, but none supply the fundamental deficiencies of Shiraiwa noted at the interview and above.

In view of the above amendment, Applicants believe the pending application is clearly in condition for allowance.

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Respectfully submitted,

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